

# Results for Abstract

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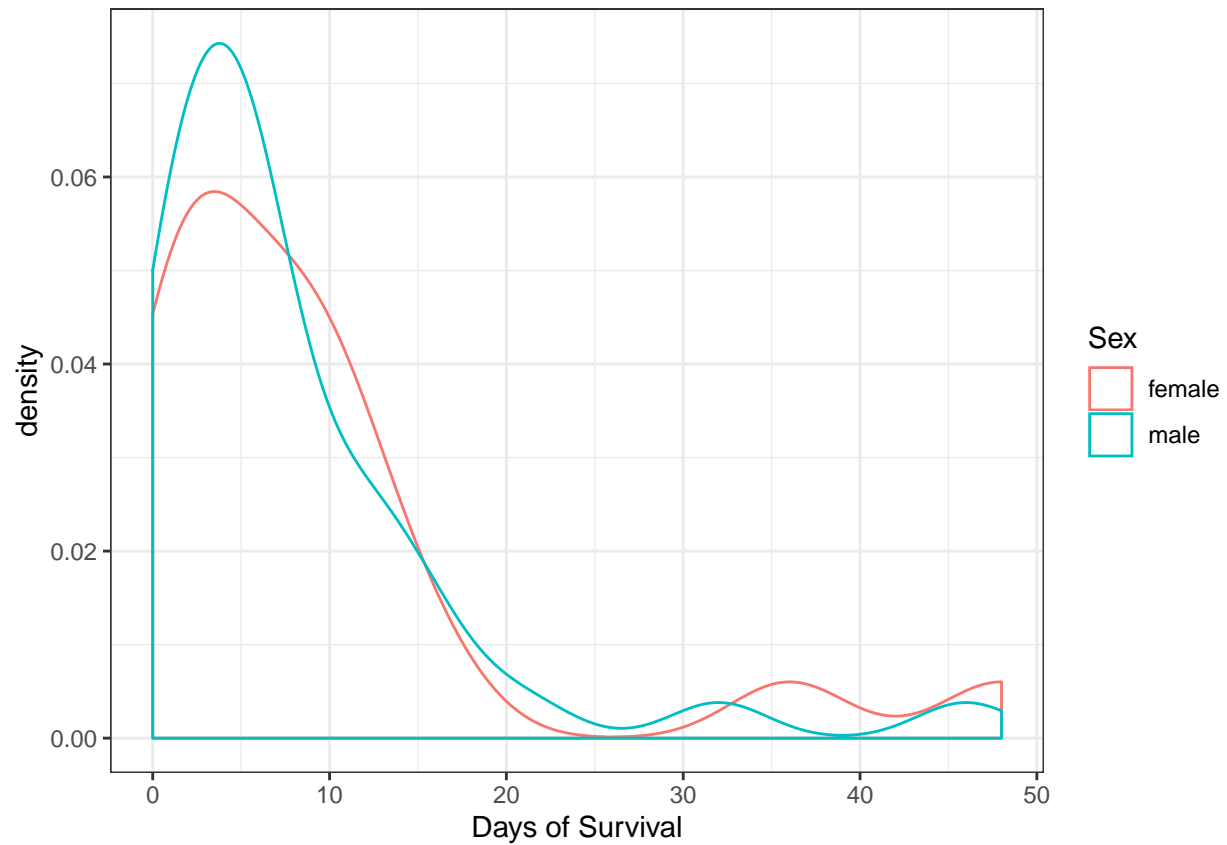
4/14/2020

```
source("02_analysis/01_visualize.R")
source("02_analysis/02_k-m_stats.R")
```

```
### density plots
```

```
data %>%
  filter(state == "deceased") %>%
  mutate(survival_days = as.numeric(survival_days, units = "days")) %>%
  ggplot(aes(x = survival_days, color = sex)) +
  geom_density(alpha = 0.3) +
  xlab("Days of Survival") +
  scale_color_discrete(name = "Sex") +
  theme_bw()
```

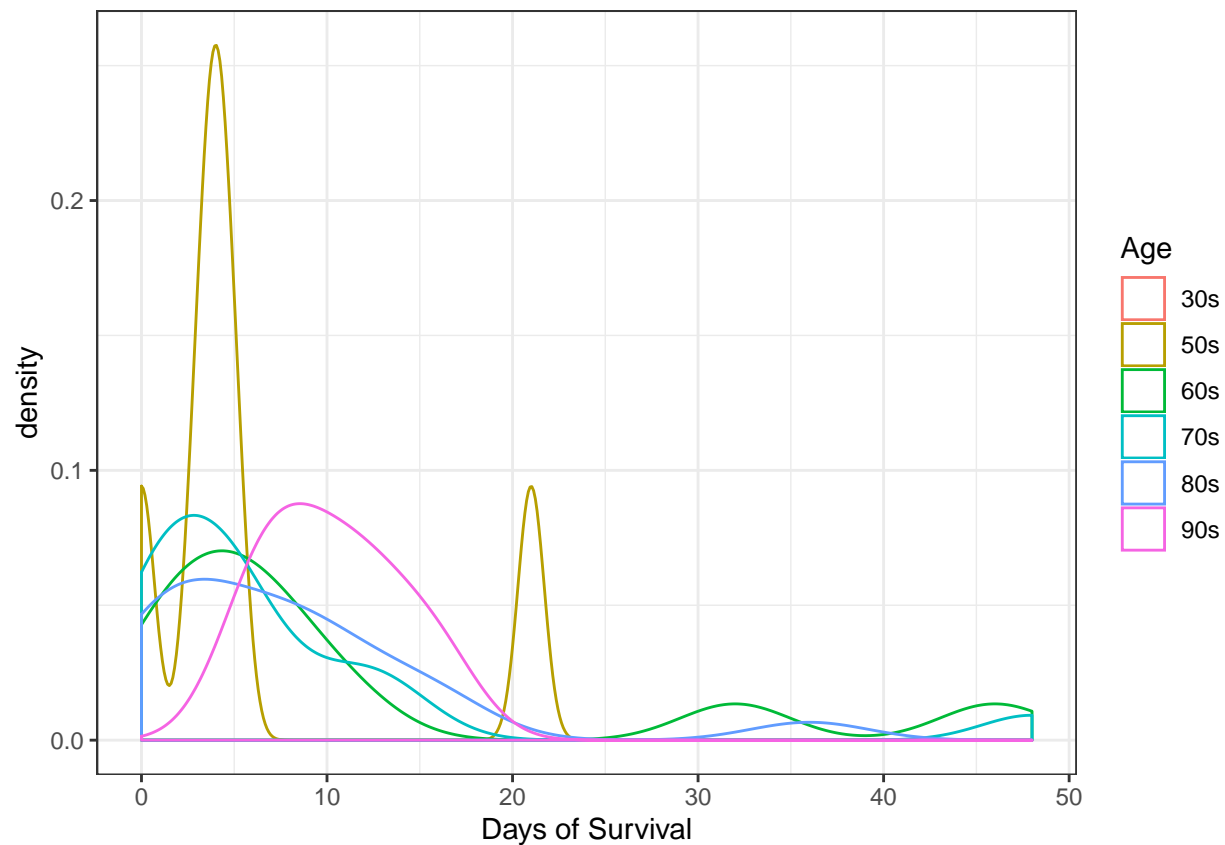
```
## Warning: Removed 7 rows containing non-finite values (stat_density).
```



```
data %>%
  filter(state == "deceased") %>%
  mutate(survival_days = as.numeric(survival_days, units = "days")) %>%
  ggplot(aes(x = survival_days, color = age_cat)) +
  geom_density(alpha = 0.3) +
  xlab("Days of Survival") +
  scale_color_discrete(name = "Age") +
  theme_bw()
```

```
## Warning: Removed 7 rows containing non-finite values (stat_density).
```

```
## Warning: Groups with fewer than two data points have been dropped.
```



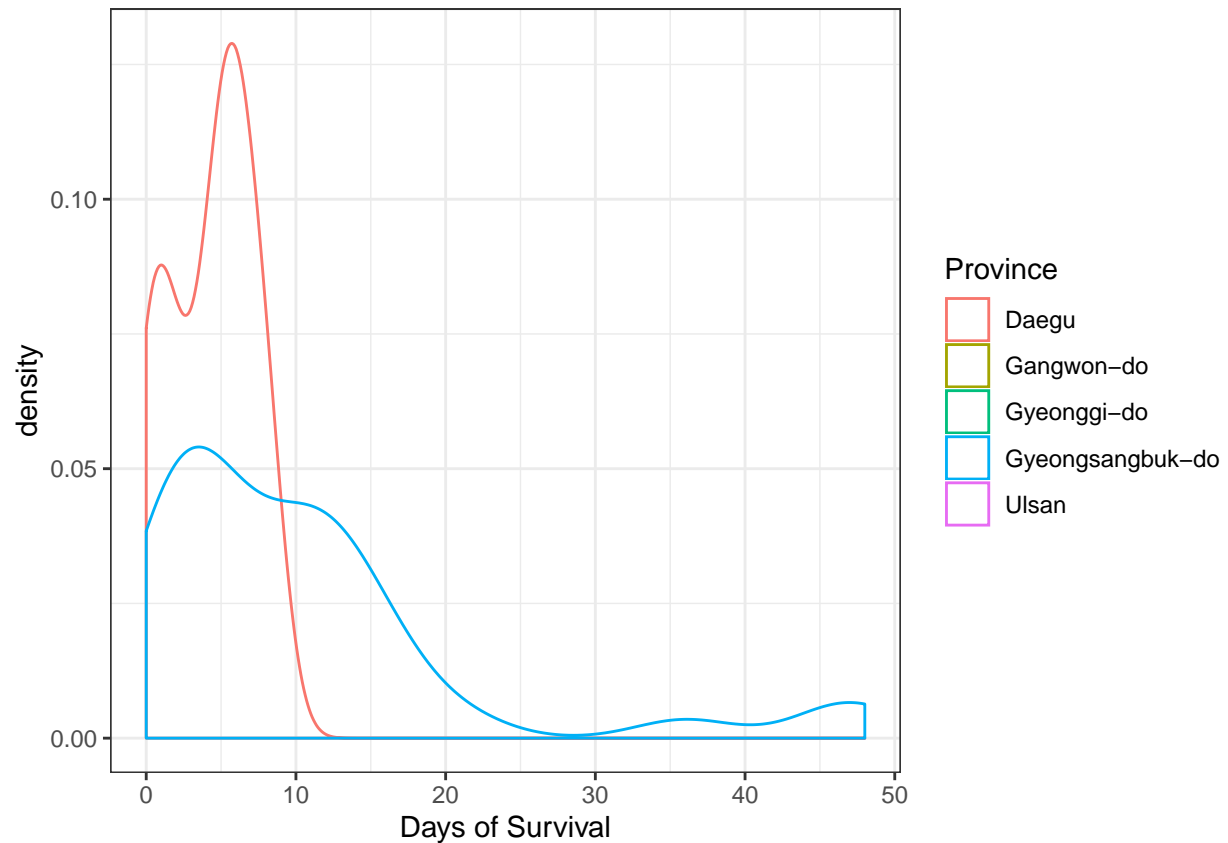
```
data %>%
  filter(state == "deceased") %>%
  mutate(survival_days = as.numeric(survival_days, units = "days")) %>%
  ggplot(aes(x = survival_days, color = province)) +
  geom_density(alpha = 0.3) +
  xlab("Days of Survival") +
  scale_color_discrete(name = "Province") +
  theme_bw()
```

```
## Warning: Removed 7 rows containing non-finite values (stat_density).
```

```
## Warning: Groups with fewer than two data points have been dropped.
```

```
## Warning: Groups with fewer than two data points have been dropped.
```

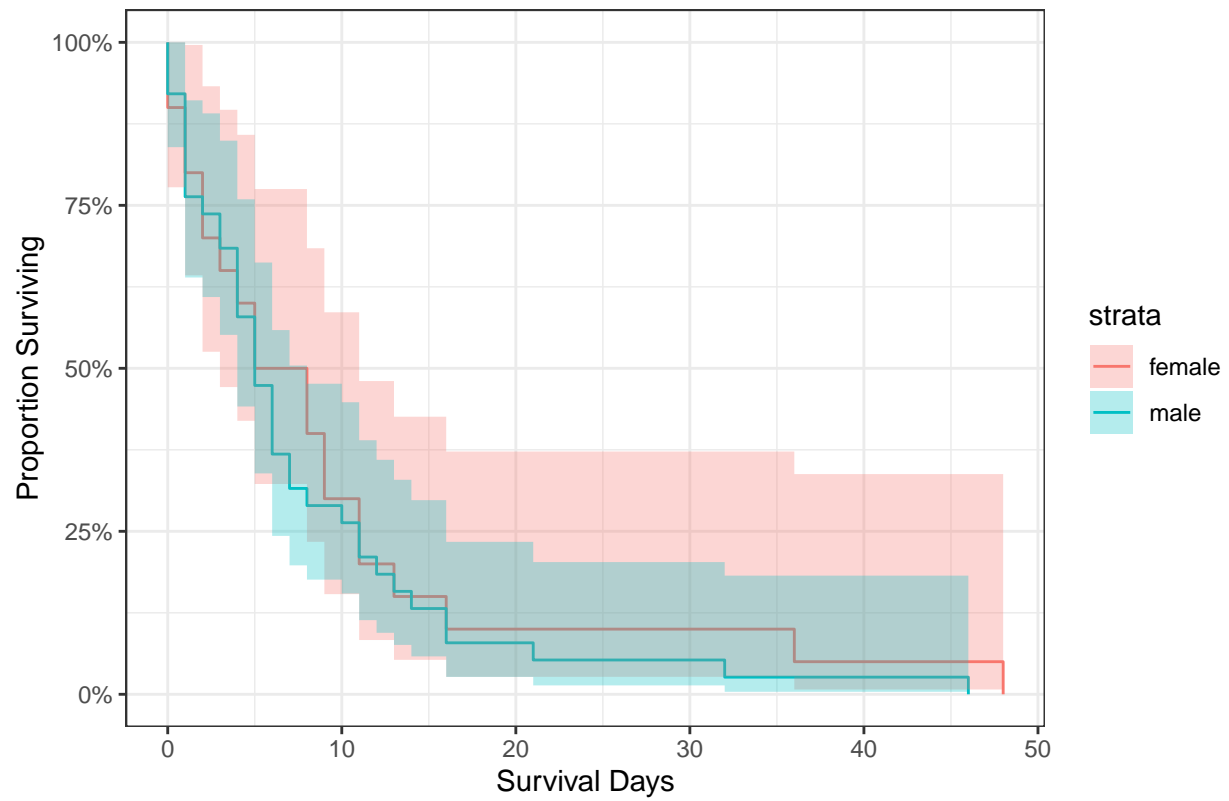
```
## Warning: Groups with fewer than two data points have been dropped.
```



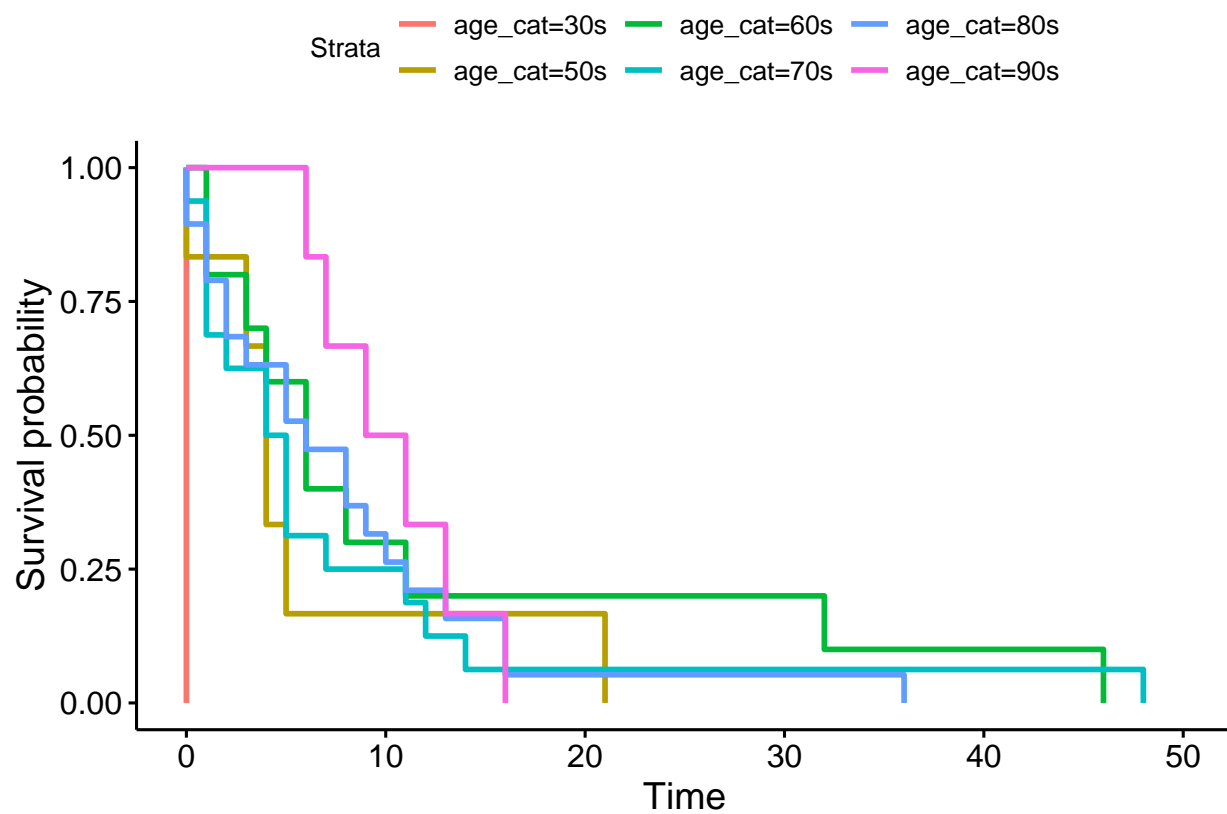
```
### K-M values and K-M curves
sex_surv <- survfit(Surv(survival_days, event, type = "right") ~ sex, data)
#age_surv_data <- data %>%
#  filter(age_cat %in% c("30s", "50s", "60s", "70s", "80s", "90s"))
age_surv <- survfit(Surv(survival_days, event, type = "right") ~ age_cat, data)
province_surv <- survfit(Surv(survival_days, event, type = "right") ~ province, data)

autoplot(sex_surv) +
  labs(x = "Survival Days", y = "Proportion Surviving", title = "KM Survival Plots by Sex") +
  theme_bw()
```

KM Survival Plots by Sex

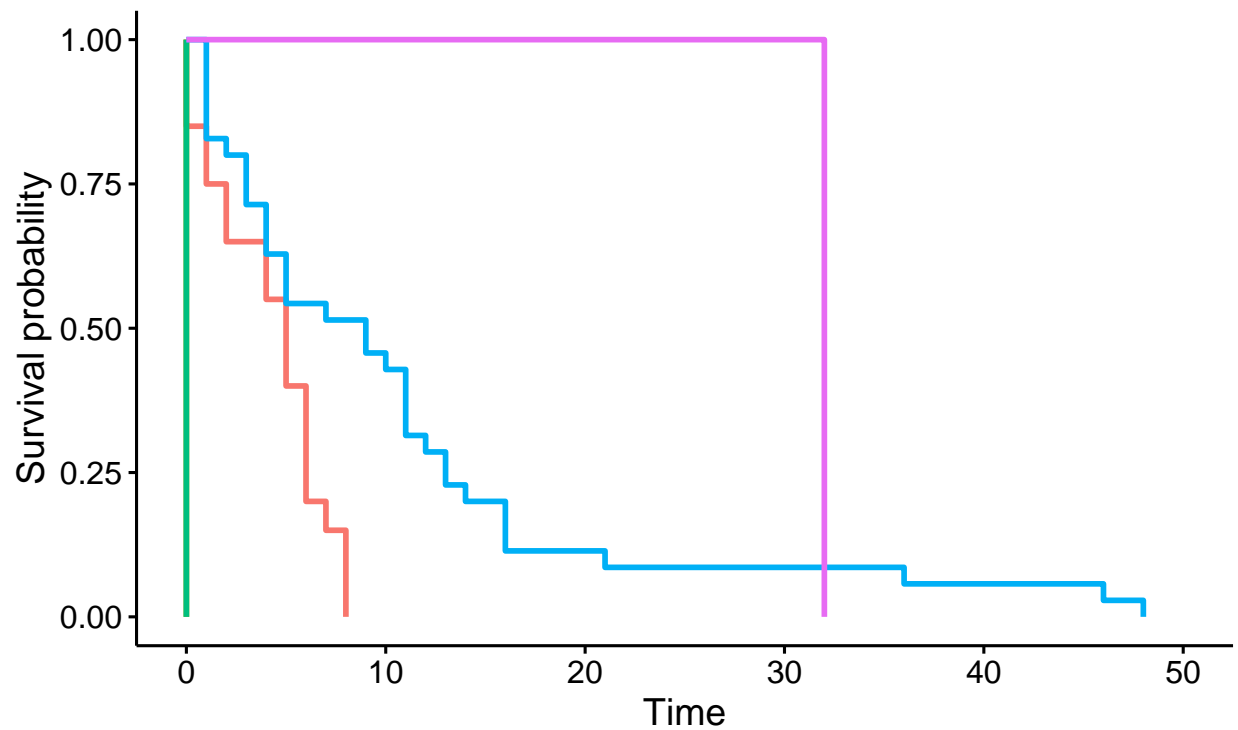


```
ggsurvplot(age_surv, data = data, conf.int = F)
```



```
ggsurvplot(province_surv, data = data, conf.int = F)
```

province=Daegu    province=Gangwon-do    province=Gyeonggi-do    province=Gyeongsangbuk-



sex\_surv

```
## Call: survfit(formula = Surv(survival_days, event, type = "right") ~
##       sex, data = data)
##
##      3193 observations deleted due to missingness
##              n events median 0.95LCL 0.95UCL
## sex=female  20      20    6.5       3      11
## sex=male    38      38    5.0       4       8
```

age\_surv

```
## Call: survfit(formula = Surv(survival_days, event, type = "right") ~
##       age_cat, data = data)
##
##      3193 observations deleted due to missingness
##              n events median 0.95LCL 0.95UCL
## age_cat=30s   1       1    0.0       NA     NA
## age_cat=50s   6       6    4.0       3     NA
## age_cat=60s  10      10    6.0       3     NA
## age_cat=70s  16      16    4.5       1     12
## age_cat=80s  19      19    6.0       3     13
## age_cat=90s   6       6   10.0       7     NA
```

```
province_surv
```

```
## Call: survfit(formula = Surv(survival_days, event, type = "right") ~
##     province, data = data)
##
## 3193 observations deleted due to missingness
##
```

	n	events	median	0.95LCL	0.95UCL
## province=Daegu	20	20	5	2	6
## province=Gangwon-do	1	1	0	NA	NA
## province=Gyeonggi-do	1	1	0	NA	NA
## province=Gyeongsangbuk-do	35	35	9	4	12
## province=Ulsan	1	1	32	NA	NA

```
(sex_surv_lr <- survdiff(Surv(survival_days, event, type = "right") ~ sex, data))
```

```
## Call:
## survdiff(formula = Surv(survival_days, event, type = "right") ~
##     sex, data = data)
##
## n=58, 3193 observations deleted due to missingness.
##
```

	N	Observed	Expected	(O-E) <sup>2</sup> /E	(O-E) <sup>2</sup> /V
## sex=female	20	20	22.2	0.218	0.411
## sex=male	38	38	35.8	0.135	0.411

```
##
## Chisq= 0.4 on 1 degrees of freedom, p= 0.5
```

```
(age_surv_lr <- survdiff(Surv(survival_days, event, type = "right") ~ age_cat, data))
```

```
## Call:
## survdiff(formula = Surv(survival_days, event, type = "right") ~
##     age_cat, data = data)
##
## n=58, 3193 observations deleted due to missingness.
##
```

	N	Observed	Expected	(O-E) <sup>2</sup> /E	(O-E) <sup>2</sup> /V
## age_cat=30s	1	1	0.0862	9.68621	10.60000
## age_cat=50s	6	6	4.5561	0.45759	0.56802
## age_cat=60s	10	10	11.6466	0.23279	0.33571
## age_cat=70s	16	16	14.6118	0.13188	0.21023
## age_cat=80s	19	19	18.8365	0.00142	0.00241
## age_cat=90s	6	6	8.2627	0.61964	0.83478

```
##
## Chisq= 12.3 on 5 degrees of freedom, p= 0.03
```

```
(province_surv_lr <- survdiff(Surv(survival_days, event, type = "right") ~ province, data))
```

```
## Call:
## survdiff(formula = Surv(survival_days, event, type = "right") ~
##     province, data = data)
##
```



```
## n=58, 3193 observations deleted due to missingness.
##
##               N Observed Expected (O-E)^2/E (O-E)^2/V
## province=Daegu      20      20  11.7119      5.87      9.51
## province=Gangwon-do    1       1   0.0862      9.69     10.60
## province=Gyeonggi-do    1       1   0.0862      9.69     10.60
## province=Gyeongsangbuk-do 35      35  43.4579      1.65      8.05
## province=Ulsan         1       1   2.6578      1.03      1.28
##
##  Chisq= 33.5  on 4 degrees of freedom, p= 1e-06
```

```
(sex_surv_cox <- coxph(Surv(survival_days, event, type = "right") ~ sex, data))
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       sex, data = data)
##
##               coef exp(coef) se(coef)      z      p
## sexmale 0.1757      1.1920   0.2828 0.621 0.535
##
## Likelihood ratio test=0.39  on 1 df, p=0.5309
## n= 58, number of events= 58
## (3193 observations deleted due to missingness)
```

```
(age_surv_cox <- coxph(Surv(survival_days, event, type = "right") ~ approx_age, data))
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       approx_age, data = data)
##
##               coef exp(coef) se(coef)      z      p
## approx_age -0.01175   0.98832  0.01152 -1.019 0.308
##
## Likelihood ratio test=1.02  on 1 df, p=0.3133
## n= 54, number of events= 54
## (3197 observations deleted due to missingness)
```

```
(province_surv_cox <- coxph(Surv(survival_days, event, type = "right") ~ province, data))
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       province, data = data)
##
##               coef exp(coef) se(coef)      z      p
## provinceGangwon-do    2.9426  18.9651   1.1848  2.484 0.01300
## provinceGyeonggi-do    2.9426  18.9651   1.1848  2.484 0.01300
## provinceGyeongsangbuk-do -1.0879   0.3369   0.3386 -3.212 0.00132
## provinceUlsan         -2.0403   0.1300   1.0640 -1.918 0.05517
##
## Likelihood ratio test=20.85  on 4 df, p=0.0003384
## n= 58, number of events= 58
## (3193 observations deleted due to missingness)
```

```
summary(sex_surv_cox)
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       sex, data = data)
##
##   n= 58, number of events= 58
##   (3193 observations deleted due to missingness)
##
##               coef exp(coef) se(coef)      z Pr(>|z|)
## sexmale 0.1757    1.1920   0.2828 0.621   0.535
##
##               exp(coef) exp(-coef) lower .95 upper .95
## sexmale    1.192      0.8389    0.6847    2.075
##
## Concordance= 0.513 (se = 0.04 )
## Likelihood ratio test= 0.39 on 1 df,  p=0.5
## Wald test              = 0.39 on 1 df,  p=0.5
## Score (logrank) test = 0.39 on 1 df,  p=0.5
```

```
summary(age_surv_cox)
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       approx_age, data = data)
##
##   n= 54, number of events= 54
##   (3197 observations deleted due to missingness)
##
##               coef exp(coef) se(coef)      z Pr(>|z|)
## approx_age -0.01175   0.98832 0.01152 -1.019   0.308
##
##               exp(coef) exp(-coef) lower .95 upper .95
## approx_age    0.9883    1.012    0.9663    1.011
##
## Concordance= 0.616 (se = 0.049 )
## Likelihood ratio test= 1.02 on 1 df,  p=0.3
## Wald test              = 1.04 on 1 df,  p=0.3
## Score (logrank) test = 1.04 on 1 df,  p=0.3
```

```
summary(province_surv_cox)
```

```
## Call:
## coxph(formula = Surv(survival_days, event, type = "right") ~
##       province, data = data)
##
##   n= 58, number of events= 58
##   (3193 observations deleted due to missingness)
##
##               coef exp(coef) se(coef)      z Pr(>|z|)
## provinceGangwon-do    2.9426   18.9651   1.1848  2.484 0.01300 *
```

```

## provinceGyeonggi-do      2.9426   18.9651   1.1848   2.484   0.01300 *
## provinceGyeongsangbuk-do -1.0879    0.3369   0.3386  -3.212   0.00132 **
## provinceUlsan            -2.0403    0.1300   1.0640  -1.918   0.05517 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##               exp(coef) exp(-coef) lower .95 upper .95
## provinceGangwon-do      18.9651    0.05273   1.85980  193.3944
## provinceGyeonggi-do     18.9651    0.05273   1.85980  193.3944
## provinceGyeongsangbuk-do  0.3369    2.96797   0.17350   0.6543
## provinceUlsan           0.1300    7.69297   0.01615   1.0461
##
## Concordance= 0.635 (se = 0.038 )
## Likelihood ratio test= 20.85 on 4 df,  p=3e-04
## Wald test              = 24.28 on 4 df,  p=7e-05
## Score (logrank) test = 46.79 on 4 df,  p=2e-09

```